Terrorism, Militarism, And Stock Returns

By: **Jeffrey Hobbs**, Ludwig Christian Schaupp, & Joel Gingrich

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Jeffrey Hobbs, Ludwig Christian Schaupp, Joel Gingrich, (2016) "Terrorism, militarism, and stock returns", Journal of Financial Crime, Vol. 23 Issue: 1, pp.70-86, https://doi.org/10.1108/JFC-01-2015-0002. Publisher version of record available at: https://www.emeraldinsight.com/doi/full/10.1108/JFC-01-2015-0002

Terrorism, militarism, and stock returns

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Abstract

Purpose – This study aims to examine the effect on stock returns of 28 terrorist and military events occurring between 1963 and 2012. The authors divide the sample and examine these attacks on the basis of industry, country targeted, location, terrorism versus militarism and predicted overall impact.

Design/methodology/approach – The authors measure the effects of the events in our sample along several dimensions: in the aggregate; comparatively across industries; by each event's predicted level of impact; by the type of event (terrorist versus military); by the location of the attack (USA or outside the USA); and by whether the USA was, directly or by proxy, the primary target of the attack.

Findings – Stock returns are significantly lower for those industries predicted to be most hurt than for other industries. Events that the authors predict to be of high impact to the market are followed by significantly lower returns than events we predict to be of low impact. Stocks perform significantly worse on the days of terrorist events than on the days of military events, but the opposite is true for the day after. Significantly lower returns follow events that occur inside the USA or where the USA was the primary target.

Research limitations/implications – This study focuses on 28 high-profile events over a 50-year period and makes several new contributions to the literature. The authors find compelling cross-sectional differences between stock returns at the industry level as well as predictable differences in mean returns between events. The authors distinguish between terrorist and military attacks and also separate the sample geographically.

Practical implications – The authors believe that this study can help researchers and investors more deeply understand the overall market and industry effects of significant terrorist and military events.

Social implications – By offering a thorough examination of the differences between high-profile attacks in the context of stock returns both on the day of and the day immediately following those attacks, the authors hope that people will be able to better grasp the likelihood and magnitude of the initial damage done by these attacks as well as the subsequent recovery.

Originality/value – Most studies that examine the effects of terrorism on the stock market focus on one or two specific events or stock market locations. They also tend to concentrate on very specific characteristics of the attack(s) that they examine, such as the size of the market or the aggregate effect to that market. The authors study 28 high-profile events over a 50-year period and examine them by industry, country targeted, location, terrorism versus militarism and predicted overall impact. This study presents many new results using these classifications.

Keywords Event studies, Stock returns, Terrorism, Militarism

Paper type Research paper

1. Introduction

Several studies have examined the effect of terrorism on stock returns. In this paper, we attempt to add to and expand upon that literature by using a sample of both terrorist and military events, largely compiled from documents issued by the US Department of State, over the period 1963-2012. We measure the effects of the events in our sample along several dimensions: in the aggregate; comparatively across industries; by each event's predicted level of impact; by the type of event (terrorist versus military); by the location of the attack (USA or outside the USA); and by whether the USA was, directly or by proxy, the primary target of the attack. In addition to confirming some of the findings of the pre-existing literature, we also provide some new results that hopefully will add to our body of knowledge in this area.

Studies on terrorism vary considerably, but most are specific in some way. For example, many focus on just one or a few events, a short time period or on specific types of events. Karolyi (2006) summarizes much of the financial and economic research on the effects of terrorism. This research finds that, generally, acts of terrorism do in fact hurt the stock market. Arin *et al.* (2008) find that terrorism affects both the returns and the volatility of stocks, especially in emerging markets. Baumert *et al.* (2013) argue that while the market indeed reacts to terrorism, the effect has diminished in recent years, while Kollias *et al.* (2011) find no clear pattern or change over time for data specific to the London and Athens exchanges. Similar to Arin *et al.* (2008), however, the authors do find that the smaller market (Athens) is more sensitive to terrorist attacks than is the larger market (London). Kollias *et al.* (2011) examined the 2004 Madrid and 2005 London attacks and found widespread negative returns in Spain along with a slower market rebound following the attack. Other studies focusing on specific events include Chen and Seims (2004), Berrebi and Klor (2005), Abadie and Gardeazabal (2003) and Guidolin and La Ferrara (2005).

Some studies consider the effects of terrorism from other angles. For example, Johnston and Nedelescu (2006) study the September 11, 2001, New York City and 2004 Madrid attacks from both a market reaction and crisis management standpoint. Chesney *et al.* (2011) compare terrorism to financial crashes and natural disasters and give investment advice on which industries offer better diversification and better protection against the acts of terrorism on the whole.

Finally, Karolyi and Martell (2006) examine 75 attacks targeting publicly traded firms between the years 1995 and 2002. The authors find a negative stock market return around such events, especially for those attacks that involved "human capital losses" such as kidnappings. Interestingly, there is not much industry-level research on the impact of terrorism. Much of the research that does exist in this area focuses on 9/11. Cummins and Lewis (2003) examine the effect of the attacks on September 11, 2001, on property/casualty insurers, Brown *et al.* (2004) on insurance companies, Kallberg *et al.* (2005) on real estate investment trusts (REITs) and Doherty *et al.* (2003) also on insurance companies. Alternatively, Drakos and Khutan (2003) examine the effect of terrorist attacks on the tourism industry in Greece, Israel and Turkey.

This study corroborates the general findings in the existing literature and also provides some new results. First, we examine a broad sample of 28 large-scale terrorist and military events occurring over a nearly 50-year period beginning with the assassination of John F. Kennedy in 1963 and ending with the attack on the US Embassy in Libya on September 11, 2012. The breadth of this sample differs from most of the

existing literature on this topic. Second, we examine each event on an industry level and compare the effects on industries that we predict to be most damaged by the event to other industries. Third, we compare events that we predict to be of high impact to events that we predict to be of low impact in the context of overall stock returns. Fourth, we distinguish between terrorism and militarism by classifying each event as one or the other and then comparing the two groups on the basis of its attendant stock returns. Finally, we study the effects of terrorism and militarism based on the location of the attack (within the USA versus outside the USA) and on the target of the attack (USA or non-USA).

We structure the rest of our paper as follows. Section 2 describes the sample construction and methods of the study. Section 3 provides some overall results of the effect of terrorism and militarism on the market. Section 4 examines the data in more detail by distinguishing between industries, the predicted levels of impact for the different events and the types of events. Section 5 focuses on the location of the attack and the location of the target. Section 6 describes the results of six multiple regressions involving the set of predictor variables developed in the previous sections. Section 7 concludes the study.

2. Data and methods

We originally selected several major terrorist incidents from the US Department of State's archive of "Significant Terrorist Incidents, 1961-2003: A Brief Chronology" file, which outlines roughly 250 events occurring between 1961 and 2003. We intended to focus on some of the largest and most notorious events, and the online chronology (which can be available at: http://2001-2009.state.gov/r/pa/ho/pubs/fs/5902.htm) was very helpful in doing so. We added a significant military event, the beginning of the 1991 Gulf War, by using a chronology of the war that was published by USA Today: http://usatoday30.usatoday.com/news/index/iraq/nirq050.htm. We also consulted "Johnston's Archive" (www.johnstonsarchive.net/terrorism/wrjp255a.html), which is sourced from US government releases, research papers from historic organizations and mainstream news archives and the FBI's "Major Terrorism Cases" file (www.fbi.gov/about-us/investigate/terrorism/terrorism_cases), to round out our sample. From these lists of terrorist attacks and military incidents, we ended up selecting 28 events. We then predicted each event to have either a high, medium or low impact on the market, we designated each event as either "terrorism" or "military", each event location as domestic (USA) or foreign and each event by whether the USA was the primary country targeted. Table I presents all of the events in our sample along with their dates, times and various designations. Although our sample concentrates more heavily in the past two decades, almost half of the events occur between 1963 and 1993, with the rest occurring between 1995 and 2012. Overall, we predict four events to have high impact on the market (versus 11 having medium impact and 13 having low impact), we classify 23 of the events as terrorism and 5 as militarism, 6 of the events occurred in the USA while 22 occurred outside the USA, and the USA was the "target" country 12 times, while other countries were the primary target 16 times.

For each event, we calculate both the equally weighted and value-weighted returns for all stocks included in the Center for Research in Security Prices (CRSP) database for the day of and day immediately following the event. The reader can consider these returns to be "normal", "market" or "unadjusted" returns. If the event occurred after 4:00

Table I.
List of terrorism and military events

No.	Event	Date	EST adjusted	Impact L, M and H	Event type Terror/military	Location Domestic/foreign	Target USA/other
1	US President Assassinated	22 November 1963	2:33 p.m.	M	Terror	Domestic	USA
2	Bloody Friday	21 July 1972	10:00 a.m.	L	Terror	Foreign	Other
3	Munich Olympic Massacre	5 September 1972	1:00 a.m.	L	Terror	Foreign	Other
4	Wall Street Bombing Domestic Terrorism	24 January 1975	1:29 p.m.	L	Terror	Domestic	USA
5	US Installation Bombing	31 August 1981	9:20 p.m. [30 August]	L	Terror	Foreign	USA
6	Bombing of US Embassy in Beirut	18 April 1983	6:00 a.m.	M	Terror	Foreign	USA
7	TWA Hijacking	14 June 1985	4:00 a.m.	M	Terror	Foreign	Other
8	Pan Am 103 Bombing	21 December 1988	2:00 p.m.	M	Terror	Foreign	Other
9	Assassination of German Bank Chairman	30 November 1989	2:00 a.m.	L	Terror	Foreign	Other
10	Iraq Invades Kuwait	2 August 1990	7:00 p.m. [1 August]	M	Military	Foreign	Other
11	Start the First Gulf War	16 January 1991	7:00 p.m.	H	Military	Foreign	Other
12	World Trade Center Bombing	26 February 1993	12:18 p.m.	H	Terror	Domestic	USA
13	Bombing of Federal Building in Oklahoma City	19 April 1995	10:00 a.m.	M	Terror	Domestic	USA
14	Empire State Building Sniper Attack	23 February 1997	5:00 p.m.	L	Terror	Domestic	USA
15	US Embassy Bombings in East Africa	7 August 1998	3:30 a.m.	L	Terror	Foreign	USA
16	Attack on USS Cole	12 October 2000	4:20 a.m.	M	Terror	Foreign	USA
17	Terrorist Attacks on US Homeland	11 September 2001	8:46 a.m.	H	Terror	Domestic	USA
18	Official Start of "Operation Enduring Freedom"	7 October 2001	1:00 p.m.	H	Military	Foreign	Other
19	Kidnapping of Daniel Pearl	23 January 2002	7:00 p.m.	L	Terror	Foreign	USA
20	Car Bomb Explosion in Bali	12 October 2002	11:00 a.m.	L	Terror	Foreign	Other
21	Official Start of "Operation Iraqi Freedom"	19 March 2003	9:34 p.m.	M	Military	Foreign	Other
22	Train Bombings in Spain	11 March 2004	1:34 a.m.	L	Terror	Foreign	Other
23	Bus and Train Bombings in London (I)	7 July 2005	3:50 a.m.	M	Terror	Foreign	Other
24	Bus and Train Bombings in London (II)	25 July 2005	9:00 a.m.	M	Terror	Foreign	Other
25	Train Bombings in India	11 July 2006	9:00 a.m.	L	Terror	Foreign	Other
26	Coordinated car bombings in Iraq	14 August 2007	11:30 a.m.	L	Terror	Foreign	Other
27	Bin Laden Killed in Operation in Pakistan	2 May 2011	11:35 p.m.	L	Military	Foreign	Other
28	Embassy Attack/Ambassador to Libya Killed	11 September 2012	5:30 p.m.	M	Terror	Foreign	USA

Notes: The table above lists the 28 events in our sample, along with the date and eastern standard time of each event; also included are the predicted market impact of each event (high, medium or low) and the designation of each event as either a terrorist attack or military attack, domestic attack or foreign attack and the USA; target or other target attack; all of the "Domestic" attacks in our sample are attacks in which the USA was the primary target, but not all "Foreign" attacks had foreign targets; for example, the most recent event in our sample, the US Embassy attack in Libya, occurred on foreign soil but clearly targeted the USA

p.m. Eastern Time, we use the following two trading days instead. We examine these returns both in isolation and in comparison with market returns occurring on non-event days. We also predict which industries will be most adversely affected by each event and then divide the sample along two-digit and four-digit SIC codes on that basis to compare the event-period returns to the two industry groups. We provide more details on our industry-level analysis in Section 4 of this study.

3. Aggregate effects of terrorism and militarism

We begin by examining the overall effects of our sample of terrorist and military events on the stock market. Table II presents the results. In the left portion of Panel A, we produce the mean returns to all companies in the CRSP database across all 28 events for both the day of and the day immediately following the event. The results, though non-trivial (and highly statistically significant), are nonetheless not economically devastating. On the day of the event, the average firm's stock fell roughly one-quarter of one percentage point. On the next trading day, the average stock recovered all of that initial loss and then some. The middle and right portions of Panel A show similar results for the day of the attack, along with a more-than-full recovery on the day after. Because the numbers shown are average market portfolio returns (value-weighted in the middle portion of Panel A and equally weighted in the right-hand portion) over the 28 events, the sample thus consists of only 28 observations and the results are generally insignificant.

	Mean returns across all firms for all events			Value-weighted market portfolio returns (mean of 28 events)			Equally-weighted market portfolio returns (mean of 28 events)		
Day	*N*	Return (%)	*t*-statistic	*N*	Return (%)	*t*-statistic	*N*	Return (%)	*t*-statistic
					Panel A				
0	175,166	−0.200	−16.45***	28	−0.279	−0.95	28	−0.218	−0.87
1	175,166	0.246	20.14***	28	0.622	1.99*	28	0.353	1.45

	Value-weighted market portfolio returns (Day 0)			Equally-weighted market portfolio returns (Day 0)		
Event?	*N*	Return (%)	*t*-statistic	*N*	Return (%)	*t*-statistic
			Panel B			
Yes	28	−0.279	−0.95	28	−0.218	−0.87
No	12,558	0.043	4.88***	12,558	0.079	10.59***
Difference (Yes − No)		−0.322	1.10		−0.298	1.18

Notes: The table above provides mean returns to individual stocks and to value- and equally-weighted portfolios of stocks on the trading day of and immediately following the 28 terrorist or military attacks in our sample; the left portion of panel A shows the mean return to all of the stocks in the CRSP database on those days; the center and right portions provide the value- and equally-weighted returns, respectively; Panel B compares the mean value- and equally-weighted market returns on the day of the event to the mean returns on other days. ***denotes statistical significance at the 1% level; **significance at the 5% level; and *significance at the 10% level

Table II.
Mean event-period returns

Panel B of Table II compares the equally- and value-weighted market portfolio returns on the days of terrorist and military events to other days. As expected, the returns on other days are slightly positive, reflecting the small daily expected return to investing in the stock market. On event days, the average return is roughly 0.3 per cent lower than for non-event days (one can consider this an abnormal market return of −0.3 per cent when benchmarked against days that are not affected by terrorist or military events). Again, however, the relatively small number of events in our sample renders the difference statistically insignificant.

Table III shows the mean return across all companies in the CRSP database for each of the 28 events in our sample. The results vary considerably, with a significantly negative market return occurring on the day of 12 of those events, but with significant positive returns occurring on the day of many other events. The most extreme of these events, from the perspective of the mean same-day stock return, was the September 11,

Date	Event	OBS.	Mean return (%)	*t*-statistic
22 November 1963,	John F. Kennedy Assassinated	2,052	−2.916	−28.21***
21 July 1972	Bloody Friday	2,625	0.590	12.19***
5 September 1972	Munich Olympic Massacre	2,637	−0.296	−6.50***
24 January 1975	Wall Street Bombing	1,958	3.027	26.75***
31 August 1981	US Installation Bombing	5,149	−0.788	−19.61***
18 April 1983	Beirut US Embassy Bombing	5,478	0.639	12.81***
14 June 1985	TWA Hijacking	6,238	0.331	7.59***
21 December 1988	Pan Am 103 Bombing	6,932	−0.038	−0.71
30 November 1989	German Bank Chairman Assassinated	6,760	0.170	3.10***
2 August 1990	Iraq Invades Kuwait	6,765	−0.874	−13.92***
16 January 1991	Start of the First Gulf War	6,681	2.327	26.99***
26 February 1993	World Trade Center Bombing	6,989	0.709	9.69***
19 April 1995	Bombing of Fed. Bldg. in Oklahoma City	8,197	−0.185	−3.29***
23 February 1997	Empire State Bldg. Sniper Attack	6,729	0.088	1.42
7 August 1998	US Embassy Bombings in East Africa	8,974	1.357	23.29***
12 October 2000	Attack on USS. Cole	8,258	−2.081	−30.23***
11 September 2001	Terrorist Attacks on US Homeland	7,492	−4.247	−36.83***
7 October 2001	Official Start of "Operation Enduring Freedom"	7,491	−0.202	−2.94***
23 January 2002	Kidnapping of Daniel Pearl	7,350	0.559	11.46***
12 October 2002	Car Bomb Explosion in Bali	7,014	0.346	5.05***
19 March 2003	Official Start of "Operation Iraqi Freedom"	6,758	0.410	7.66***
11 March 2004	Train Bombings in Spain	6,543	−1.180	−32.32***
7 July 2005	Bus and Train Bombings in London, I	6,727	0.139	4.81***
25 July 2005	Bus and Train Bombings in London, II	6,662	−0.425	−11.31***
11 July 2006	Train Bombings in India	6,726	0.326	9.97***
14 August 2007	Coordinated Car Bombings in Iraq	6,937	−1.753	−43.57***
2 May 2011	Bin Laden Killed in Pakistan	6,428	−0.908	−26.05***
11 September 2012	US Embassy Attack in Libya	6,616	0.393	11.32***

Notes: The table above provides the date, the event, the number of firms for which adequate returns data exist in the CRSP database and the mean return of all companies on the date of the attack for all events in our sample; *** denotes statistical significance at the 1% level; ** denotes significance at the 5% level; and *denotes significance at the 10% level

Table III. Stock returns across all companies for each event

2001, attacks on the World Trade Center in New York City (−4.25 per cent), the 1975 Wall Street bombing (+3.03 per cent) and the assassination of President John F. Kennedy in the November of 1963 (−2.92 per cent). In summary, the results for individual events and for the overall market are quite mixed. In the next section of this study, we focus on these 28 events at the levels of industry, predicted impact and type of event (terrorist versus military).

4. Analysis by industry, predicted impact and type of event

4.1 Predicted industry impact

For each event, we predicted which industries we thought would be most negatively affected. In general, we predicted the finance and banking, insurance and travel and tourism industries to be the most adversely affected by the events in our sample, but the specific industries predicted to be hurt naturally varied by event. For example, we predicted the September 11 terrorist attacks to have a wider-ranging impact across industries than the TWA hijacking in the June of 1985, which we expected to primarily affect travel and tourism. Appendix provides the list of industries that we predicted to be the most negatively influenced by each event.

Table IV provides the day-of, day-after and day-of-and-after returns for two groups of firms. The first group consists of those companies for which the dichotomous variable BadInd equals 1. These firms operate in at least one industry predicted to be the most negatively affected by the event of that day, and represent about 22 per cent of our overall sample. The results in Table IV bear out our predictions. On the day of the event,

		Day 0 returns		Day +1 returns		Days [0, 1] returns	
BadInd	*N*	Return (%)	*t*-statistic	Return (%)	*t*-statistic	Return (%)	*t*-statistic
			Panel A				
1	37,972	−0.267	−12.69***	0.142	6.97***	−0.149	−5.62***
0	137,194	−0.182	−12.62***	0.274	18.90***	0.059	3.02***
Difference (0 − 1)		−0.086	−3.35***	−0.132	−5.26***	−0.208	6.32***

		Day 0 return sign		Day +1 return sign		Days [0, 1] return sign	
	N	Mean rank	*t*-statistic	Return	*t*-statistic	Return	*t*-statistic
			Panel B				
1	37,972	−0.083	−17.67***	0.072	15.52***	0.001	0.23
0	137,194	−0.068	−27.68***	0.006	2.51**	−0.033	−12.67***
Difference (0 − 1)		−0.015	−2.85***	0.066	12.58***	0.034	6.08***

Notes: Panel A below compares the day-of, day-after and two-day mean return for those companies that we predict to be more negatively affected by the events in our sample, based on the industries in which they operate, to the mean return of those that we predict to be less negatively affected; Panel B makes a similar comparison on the basis of the mean sign of the returns for the two groups, where we assign a value of +1 to a positive stock return, zero to a return of zero and −1 to a negative return; *** denotes statistical significance at the 1% level; ** denotes significance at the 5% level; and *denotes significance at the 10% level

Table IV.
Mean event-period returns by industry (predicted impact of attack)

shares of stock from the industries that we predicted to be the most negatively affected performed significantly worse than the stocks of other industries. Moreover, while stocks from other industries experienced a more-than-full rebound the following day, stocks for which BadInd = 1 experienced only a half recovery from the losses of the day before. Panel B reports the mean sign of the return (+1 for a positive return, zero for a return of zero and −1 for a negative return); the results are the same for the day of the event, but the signs reverse for the day after the event. In sum, we can say for certain that on the day of the event, the firms that were most damaged by the event were those that we predicted would be.

4.2 Predicted event impact

It is also likely that different events will have effects of different magnitudes on stock returns overall. We predict each event to be of high, medium or low impact and then compare the returns for all companies across those three categories of events. While these predictions are necessarily subjective and therefore debatable, we attempt to categorize each event on the basis of both the amount (and intensity) of the media generated and the likely economic implications of the event. By doing this, we hope to capture in our predictions both the expected material economic effects on stock returns as well as the psychological (including behavioral) effects. The events that we predicted to be of high impact on the stock market were the start of the first gulf war (January 1991), the bombing of the World Trade Center (February 1993), the attacks of September 11, 2001, and the start of the war in Afghanistan (October 2001). We predicted all of the other events in the sample to be of either medium or low impact[1].

Table V presents results that are again consistent with our initial hypothesis. Events of predicted high and medium impact resulted in significantly negative stock returns, with predicted high-impact events turning out to be the most damaging with a mean stock return of −0.45 per cent. Stock returns on the days of events predicted to be of low impact were not significantly different from zero. In addition, stock returns for predicted high-impact events were again significantly negative on the day following the event, resulting in a two-day loss of −0.83 per cent. When we examine only the sign of each company's return and ignore its magnitude (Panel B), there is no significant difference on the day zero between the predicted high-impact and predicted low-impact events. It is perhaps not surprising that it is in the magnitude of the returns where the difference between predicted high- and low-impact terrorist acts lies. In any event, the mean two-day return sign is significantly lower for predicted high-impact events than for predicted low-impact events, similar to the results in Panel A, which include the magnitude of the returns.

4.3 Type of event

The events in our sample differ also by whether they are terrorist attacks or military events. There are five military events in our sample:

(1) the invasion of Kuwait by Iraq (August 1990);

(2) the start of the first war in Iraq (January 1991);

(3) the start of the war in Afghanistan (October 2001);

(4) the start of the second war in Iraq (March 2003); and

(5) the killing of Osama Bin Laden in Pakistan (May 2011).

Predicted impact	N	Day 0 returns Return (%)	*t*-statistic	Day +1 returns Return (%)	*t*-statistic	Days [0, 1] returns Return (%)	*t*-statistic
				Panel A			
H	28,653	−0.448	−9.63***	−0.321	−7.95***	−0.830	−14.64***
M	75,830	−0.309	−18.50***	0.584	32.08***	0.231	10.44***
L	70,683	−0.006	−0.37	0.145	8.81***	0.130	5.68***
Difference (H − L)		−0.442	−9.02***	−0.466	−10.69***	−0.960	−15.70***
	N	Day 0 return sign Mean sign	*t*-statistic	Day +1 return sign Mean sign	*t*-statistic	Days [0, 1] return sign Mean sign	*t*-statistic
				Panel B			
H	28,653	−0.071	−13.30***	−0.085	−16.17***	−0.109	−19.32***
M	75,830	−0.074	−22.20***	0.145	43.59***	0.055	15.38***
L	70,683	−0.068	−20.20***	−0.055	−16.48***	−0.069	−19.59***
Difference (H − L)		−0.004	−0.60	−0.030	−4.80***	−0.040	−6.02***

Table V.
Mean event-period returns to all stocks by aggregate impact of attack

Notes: Panel A compares the day-of, day-after and two-day mean return across all stocks for those events that we predict to be of relative high, medium and low aggregate impact; The bottom row shows the difference between the aggregate returns of predicted high- and of predicted low-impact events; Panel B makes a similar comparison on the basis of the mean sign of the returns for the two groups, where we assign a value of +1 to a positive stock return, zero to a return of zero and −1 to a negative return; *** denotes statistical significance at the 1% level; ** denotes significance at the 5% level; and *denotes significance at the 10% level

We classify each of the other 23 events in the sample as a terrorist attack.

Table VI yields some interesting results. While stock returns are significantly negative on the days of terrorist attacks and significantly positive on the days of military events, the reverse is true for the trading day that immediately follows. The mean two-day stock performance, it turns out, is actually lower (more negative) for military events than it is for terrorist attacks. We obtain similar results when we focus only on the sign and ignore the magnitude of the returns, with the exception that there is no significant difference between the mean stock return signs on the day of the event for the two categories of events. In any case, it is interesting to note the opposite reversals for the two types of events, and we leave it to the reader to speculate on any possible reasons for them.

5. Geographical analysis: the location and target of the attack

5.1 The location of the attack

We next divide our sample on the basis of whether the attack occurred inside the USA. Out of 28 events, 6 occurred in the USA: the assassination of President John F. Kennedy in 1963, the Wall Street bombing of 1975, the World Trade Center bombing of 1993, the Oklahoma City bombing of 1995, the Empire State Building sniper attack of 1997 and the attacks of September 11, 2001. These domestic events represent almost 20 per cent of the stocks, across all event days, in our sample.

Event type	N	Day 0 returns Return (%)	*t*-statistic	Day +1 returns Return (%)	*t*-statistic	Days [0, 1] returns Return (%)	*t*-statistic
			Panel A				
Terrorism	141,043	−0.285	−21.34***	0.389	28.99***	0.073	4.09***
Military	34,123	0.148	5.03***	−0.348	−12.12***	−0.232	−5.96***
Difference (T − M)		−0.433	−13.40***	0.737	−23.26***	0.305	7.12***

	N	Day 0 return sign Mean sign	*t*-statistic	Day +1 return sign Mean sign	*t*-statistic	Days [0, 1] return sign Mean sign	*t*-statistic
			Panel B				
Terrorism	141,043	−0.072	−30.02***	0.058	23.95***	−0.006	−2.26**
Military	34,123	−0.065	−13.15***	−0.133	−27.39***	−0.106	−20.70***
Difference (T − M)		−0.007	−1.34	0.191	35.18***	0.101	17.54***

Notes: Panel A compares the day-of, day-after and two-day mean return across all stocks for terrorist attacks and military attacks; the bottom row shows the difference between the aggregate returns of terrorist attacks and military attacks; Panel B makes a similar comparison on the basis of the mean sign of the returns for the two groups, where we assign a value of +1 to a positive stock return, zero to a return of zero and −1 to a negative return; ***denotes statistical significance at the 1% level; **denotes significance at the 5% level; and *denotes significance at the 10% level

Table VI. Mean event-period returns to all stocks by type of event

Table VII presents a comparison of stock returns on and immediately after the six domestic events to those on and immediately following the 22 foreign events. The difference on the day of the attack is highly significant, with attacks inside the USA generating a mean return of −0.833 per cent versus only −0.051 per cent for foreign attacks. Interestingly, the returns on the day after the event are not significantly different between the two groups; while domestic attacks are followed by a recovery of about 1/3 the size of the initial loss, foreign attacks are followed by a much greater gain than the initial loss. Panel B, in which we report the results only for the sign of the return and not the magnitude, tells a similar story. Overall, it appears that the universe of CRSP stocks is much more negatively affected by attacks that occur within the USA than by attacks occurring elsewhere.

5.2 The target of the attack

The last round of analysis that we perform involves dividing the data by whether the principal target of the attack was the USA. We designate the USA to be the principal target of 12 of the 28 attacks in our sample. For us to designate the USA as the target, the attack can come from within (e.g. the Oklahoma City bombing) or from without (e.g. the September 11 attacks) and the attack need not take place on USA soil (e.g. the 1983 and 2012 attacks on the US embassies in Beirut and Libya, respectively, or the kidnapping of journalist Daniel Pearl). Overall, events primarily targeting the USA comprise about 43 per cent of the stock-days in our sample.

Table VIII provides the results of this analysis. On the day of the attack, stocks included in the CRSP database fell by an average of 0.355 per cent if the attack principally targeted the USA and only 0.084 per cent if not. However, stock returns on

Location	N	Day 0 returns Return (%)	Day 0 returns t-statistic	Day +1 returns Return (%)	Day +1 returns t-statistic	Days [0, 1] returns Return (%)	Days [0, 1] returns t-statistic
				Panel A			
Domestic	33,417	−0.833	−21.75***	0.273	7.69***	−0.609	−12.22***
Foreign	141,749	−0.051	−4.26***	0.239	19.09***	0.160	9.85***
Difference (D − F)		−0.782	−19.48***	0.034	0.90	−0.769	−14.68***

	N	Day 0 return sign Mean sign	Day 0 return sign t-statistic	Day +1 return sign Mean sign	Day +1 return sign t-statistic	Days [0, 1] return sign Mean sign	Days [0, 1] return sign t-statistic
				Panel B			
Domestic	33,417	−0.136	−28.12***	0.022	4.48***	−0.101	−19.34***
Foreign	141,749	−0.055	−22.95***	0.020	8.35***	−0.008	−2.99***
Difference (D − F)		−0.081	−14.88***	0.002	0.30	−0.093	−16.06***

Notes: Panel A below compares the day-of, day-after and two-day mean returns across all stocks for events that occur inside the USA to the returns of all stocks for events occurring outside the USA; the bottom row shows the difference between the aggregate returns for the two groups of events; Panel B makes a similar comparison on the basis of the mean sign of the returns for the two groups of events, where we assign a value of +1 to a positive stock return, zero to a return of zero and −1 to a negative return; *** denotes statistical significance at the 1% level; ** denotes significance at the 5% level; and *denotes significance at the 10% level

Table VII.
Mean event-period returns to all stocks by location of event

the day after attacks on the USA were higher than for other attacks, representing an almost complete rebound in the case of the former. Still and all, the two-day returns were lower around attacks on the USA than attacks on other countries. Panel B, however, shows a difference in the mean sign of these returns, suggesting again that the magnitude of individual stock returns is an important factor in the overall results.

6. Regression analysis

We estimate six regressions in an effort to determine the effects of all of the aforementioned variables on event-period stock returns. In these regressions, we use different combinations of five dummy variables:

(1) BadInd, which equals one if the company operates in an industry or industries that we had predicted to be the most adversely affected by the attack and zero otherwise.

(2) High Impact, which equals one if we had predicted the attack to be of relatively high market impact and zero if we had predicted the attack to be of medium or low impact.

(3) Terrorism, which equals one if we classified the attack as an act of terrorism and zero if we classified it as a military attack.

(4) USA (Location), which equals one if the attack occurred inside the USA and zero otherwise.

(5) USA (Target), which equals one if the USA was the primary target of the attack and zero otherwise.

Target	N	Day 0 returns Return (%)	Day 0 returns t-statistic	Day +1 returns Return (%)	Day +1 returns t-statistic	Days [0, 1] returns Return (%)	Days [0, 1] returns t-statistic
			Panel A				
USA	75,242	−0.355	−16.53***	0.339	16.41***	−0.062	−2.23***
Other	99,924	−0.084	−6.03***	0.175	11.96***	0.071	3.66***
Difference (USA − Other)		−0.271	−10.58***	0.164	−6.47***	−0.013	3.92***

	N	Day 0 return sign Mean sign	Day 0 return sign t-statistic	Day +1 return sign Mean sign	Day +1 return sign t-statistic	Days [0, 1] return sign Mean sign	Days [0, 1] return sign t-statistic
			Panel B				
Domestic	75,242	−0.048	−14.54***	0.036	11.05***	−0.015	−4.29***
Foreign	99,924	−0.088	−30.69***	0.009	3.00***	−0.033	−10.97***
Difference (D − F)		0.040	9.24***	0.028	6.31***	−0.018	−3.93***

Notes: Panel A compares the day-of, day-after and two-day mean returns across all stocks for events that primarily target the USA to the returns of all stocks for events that primarily target other countries; the bottom row shows the difference between the aggregate returns for the two groups of events; Panel B makes a similar comparison on the basis of the mean sign of the returns for the two groups of events, where we assign a value of +1 to a positive stock return, zero to a return of zero and −1 to a negative return; *** denotes statistical significance at the 1% level; ** denotes significance at the 5% level; and *denotes significance at the 10% level

Table VIII. Mean event-period returns to all stocks by target of attack

For each of the three return windows that we examine (Day 0, Day 1 and Day 0 and Day 1 combined), we estimate two regressions. The first regression uses BadInd, High Impact, Terrorism and USA (Location) as the predictor variables. The second also uses BadInd, High Impact and Terrorism but replaces USA (Location) with USA (Target), given that these are the two most highly correlated of the indicator variables and, in fact, the cases in which USA (Location) equals one are a subset of the cases in which USA (Target) equals one. For all of these regressions, we convert the response variable into percentage terms, meaning that a value of 1.0 is equal to 1 per cent. Therefore, the reader should interpret the coefficients in Table IX on the independent variables to be their relative contributions in percentage points toward the total return for that period.

In all six regressions, the coefficient on BadInd is negative, indicating that those firms operating in "bad" industries experience lower returns on both the day of and the day after the attack. The coefficients for Day 1 are of marginal (two-tailed) significance, however. The BadInd coefficient of −0.081 in the first regression suggests that operating in an industry that we had predicted to be the most adversely affected by the attack contributes about −0.08 per cent, in addition to the effects of the other variables, toward the overall day-zero return for the average company. The coefficients on High Impact, Terrorism, USA (Location) and USA (Target) are generally of greater magnitude and significance than the coefficient on BadInd. Similar to our previous results, we find that the events that we had predicted to be of high impact are accompanied by lower returns, as are attacks located inside the USA. Attacks for which the USA was the principal target may have lower returns; the coefficients are negative

Table IX.
Regressions of event-period stock returns on type of firm and type of event

Explanatory variable	Day 0 return	Day 0 return	Day +1 return	Day +1 return	Day [0, 1] return	Day [0, 1] return
Intercept	0.239 (7.28)***	0.369 (11.50)***	−0.129 (−3.92)***	−0.145 (−4.50)***	0.091 (2.07)**	0.203 (4.74)***
BadInd	−0.081 (−2.74)***	−0.076 (−2.56)**	−0.055 (−1.85)*	−0.055 (−1.84)*	−0.124 (−3.13)***	−0.118 (−2.97)***
High impact	−0.165 (−4.16)***	−0.483 (−13.39)***	−0.493 (−12.40)***	−0.455 (−12.59)***	−0.696 (−13.12)***	−0.971 (−20.14)***
Terrorism	−0.337 (−9.45)***	−0.560 (−15.07)***	0.565 (15.83)***	0.601 (16.17)***	0.218 (4.59)***	0.046 (0.92)
USA (Location)	−0.644 (−17.81)***			0.063 (1.74)*		−0.588 (−12.16)***
USA (Target)		−0.054 (−1.92)*		−0.017 (−0.62)		−0.097 (−2.60)***
Adjusted R^2	0.0042	0.0024	0.0043	0.0043	0.0039	0.0031

Notes: This table shows the results of six regressions on event-period stock returns; the response variable is stock returns occurring on the day of the attack for the first two regressions (listed on the left), the day immediately following the attack for the middle two regressions and the two days combined for the two regressions listed on the right; the independent variables are all dichotomous: BadInd = 0 if the company operates in an industry that we predict to be hit hardest by the attack, high impact =1 if we predict the event itself to be of high market impact, terrorism = 1 if we classify the event as a terrorist attack rather than a military attack, USA (Location) = 1 if the attack occurred in the USA and USA (Target) = 1 if the USA was the principal target of the attack; *t*-statistics are in parentheses below the coefficients for each independent variable; ***denotes statistical significance at the 1% level; **denotes significance at the 5% level; and *denotes significance at the 10% level

but range from insignificant to highly significant. Terrorist attacks have significantly lower returns than military attacks on Day 0, but significantly higher returns on Day 1. These results suggest that the variables we predict to influence returns around terrorist and military attacks do in fact help explain those returns, and in a manner, that is generally consistent with the direction of our predictions.

7. Conclusions

While there are many studies that examine the effects of terrorism on the stock market, most of those studies focus on one or two specific events or stock market locations (for additional examples, see Nguyen and Enomoto, 2009; Hon *et al.*, 2004). The studies in this area also tend to concentrate on very specific characteristics of the attack(s) that they examine, such as the size of the market affected or on the aggregate effect to that market. The most comprehensive article to date (Karolyi and Martell (2006)) examines attacks that occurred between 1995 and 2002 and thus omits many significant events that occurred outside that window.

Our study focuses on 28 high-profile events over a 50-year period and makes several new contributions to the literature. First, we find compelling cross-sectional differences between stock returns at the industry level, depending on the nature of the event. Second, we find that there are significant differences in mean returns between events and that these differences can be predicted ex-ante, with predicted high-impact events resulting in one- and two-day returns that are both significantly negative and significantly below those of the other events. Third, we distinguish between terrorist and military attacks and compare the event-period returns on that basis. Fourth, we separate our sample on the basis of geography, first by the location of the attack and then by the country primarily targeted (in both cases, we compare attacks inside or targeting the USA to those inside or targeting other countries). We find that, once again, the results are in keeping with our original predictions. Finally, we estimate six regressions on stock returns for the day of and day following the events in our sample, and find results that are consistent with our earlier analysis and conclusions.

We believe that this study can help researchers and investors to more deeply understand the overall market and industry effects of significant terrorist and military events. By offering a thorough examination of the differences between high-profile attacks in the context of stock returns both on the day of and the day immediately following those attacks, we hope that people will be able to better grasp the likelihood and magnitude of the initial damage done by these attacks as well as the subsequent recovery.

Note

1. To examine the robustness of these results, we perform an alternative set of predictions in which we change the following categories of predicted market impact. We change the predicted impact of Bloody Friday, the Munich Olympic Massacre, the Wall Street bombing, the assassination of the German bank chairman, the US embassy bombing, the bombings in Spain, the bombings in India, the bombings in Iraq and the killing of Osama bin Laden from low to medium, the invasion of Kuwait by Iraq and the Oklahoma City bombing from medium to high, the World Trade Center bombing from high to medium and the attack on the USS Cole from medium to low. The results are similar to Tables V and IX.

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Appendix. Industries predicted to be most adversely affected on the day of the event, sorted chronologically by event

US President Assassinated, November 22, 1963.
Entertainment, Non-Essential Goods, Travel and Tourism, Finance and Banking.

"Bloody Friday", July 21, 1972
Travel and Tourism.

Munich Olympic Massacre, September 5, 1972
Petroleum, Entertainment, Non-Essential Goods, Travel and Tourism.

Domestic Terrorism, January 27, 1975
Insurance, Finance and Banking.

US Installation Bombing, August 31, 1981
Non-Essential Goods, Travel and Tourism.

Bombing of US Embassy in Beirut, April 18, 1983
Petroleum, Finance and Banking.

TWA Hijacking, June 14, 1985
Travel and Tourism.

Pan Am 103 Bombing, December 21, 1988
Travel and Tourism.

Assassination of German Bank Chairman, November 30, 1989
Finance and Banking.

Iraq Invades Kuwait, August 2, 1990
Petroleum, Finance and Banking.

Start of the First Gulf War, January 16, 1991
Petroleum, Travel and Tourism, Finance and Banking.

World Trade Center Bombing, February 26, 1993
Insurance, Finance and Banking.

Bombing of the Federal Building in Oklahoma City, April 19, 1995
Non-Essential Goods, Travel and Tourism, Real Estate and Construction, Insurance, Finance and Banking.

Empire State Building Sniper Attack, February 23, 1997
Travel and Tourism.

US Embassy Bombings in East Africa, August 7, 1998
Petroleum, Travel and Tourism, Finance and Banking.

Attack on USS Cole, October 12, 2000
Petroleum, Finance and Banking.

Terrorist Attacks on US Homeland, September 11, 2001
Petroleum, Entertainment, Non-Essential Goods, Travel and Tourism, Real Estate and Construction, Insurance, Finance and Banking.

Start of Operation Enduring Freedom, the USA Invades Afghanistan, October 7, 2001
Petroleum, Entertainment, Non-Essential Goods, Travel and Tourism, Real Estate and Construction, Insurance, Finance and Banking.

Kidnapping of Daniel Pearl, January 23, 2002
Travel and Tourism.

Car Bomb Explosion in Bali, October 12, 2002
Travel and tourism.

Official Start of "Operation Iraqi Freedom", March 19, 2003
Petroleum, Entertainment, Non-Essential Goods, Travel and Tourism, Real Estate and Construction, Insurance, Finance and Banking.

Train Bombings in Spain, 11 March 2004
Entertainment, Travel and Tourism, Insurance, Finance and Banking.

Bus and Train Bombings in London, July 7, 2005, and July 21, 2005
Entertainment, Travel and Tourism, Insurance, Finance and Banking.

Train Bombings in India, July 11, 2006
Travel and Tourism.

Coordinated Car Bombings in Iraq, August 14, 2007
Petroleum, Insurance, Finance and Banking.

Bin laden Killed in Targeted Operation in Pakistan, May 2, 2011
Petroleum.

Embassy Attack and Death of US Ambassador in Libya, September 11, 2012
Petroleum, Travel and Tourism, Finance and Banking.

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